

SUPPLANTING STEAM.

The Electric Motor Has
Struck a Rattling Pace.

A Revolution of Limitless
Extent in Manufacture.

A Glance at the Work the Baby
Giant Is Now Doing in the
United States.

From the New York Sun.]

The advance made by electrical science and application during the last few years has been so phenomenal that it is hard to define its extent, and it is only when an attempt is made to follow the developments in any particular branch that an approximate idea of its mighty progress as a whole and its far-reaching and ever-widening influence in the industrial world can be arrived at.

From an investigation of the field alone, that of the electric motor, it at once becomes apparent that a revelation of limitless extent is being effected in industry and manufacture. There can be no doubt that the electric motor is the most simple and effective piece of mechanism yet devised for the transmission and transformation of energy in a trustworthy and economical manner for useful work.

ALREADY A VAST ENTERPRISE.

It is interesting to examine the different ways in which this superiority is shown, and in doing so it is advisable to eliminate from more than passing consideration the electric motor as applied to railroads and to direct attention mainly to the character and mission of stationary motors.

It is nevertheless true that the use of the electric motor for transportation purposes is an industrial one. Some idea of the extent to which it has already ousted the horse and come into competition with the steam engine, the cable and the dummy engine may be drawn from the fact that at the present time there are over 250 electric roads in this country, running at an average of 1,500 miles of track and probably 2,500 cars. These roads are already carrying between two and three hundred million passengers a year. They do this at an economy of forty to fifty per cent as compared with horses, and, moreover, have the remarkable advantage of building up traffic at a greater rate and of developing and enhancing in value new residential districts. Incredible as it may seem, also, to those who have not watched the course of events, several of the shorter steam roads of the country are now negotiating for electrical equipments, and probably before this article appears in print contracts will have been signed for roads fifteen to twenty miles long. It is expected by electrical engineers that during 1891 several such roads will be built and equipped.

IT FILLS AN INDUSTRIAL WANT.

Putting aside this field, however, attention may be confined to the use of the electric motor for stationary power purposes. It is quite possible that several of those who read these lines may never have seen an electric motor, yet it is none the less true that there are today already in operation in this country over 30,000 electric motors of various sizes, engaged in an endless variety of occupations. One company building motors reports that its machines are now employed in nearly 200 distinct industries, and that new uses are found daily. This development has been seen almost entirely within the last three years. From 1880 up to 1887 electrical engineers and contractors had given their attention mainly to the installation of electric lighting plants in American towns and cities, with the result that there were some 1,200 central stations in operation supplying the arc light or the incandescent light, and sometimes both. A great many of these stations paid well from the start, but it was soon found out that the lighting business was after all a limited one; that is, it could only be carried on during the hours of darkness, so that a valuable plant often lay idle sixteen or eighteen hours out of the twenty-four.

ITS WONDERFUL ADAPTABILITY.

Yet the current which such a plant could generate would lend itself as readily to driving an electric motor as to furnishing light in a lamp, and the same circuit that conveyed it to the lamps would also convey it to the motors. It was this fact that gave a great stimulus to the electric motor industry about three years ago, and led to the perfecting of what had theretofore been a crude and cumbersome piece of mechanism. As is now generally known the electric motor has but one moving part, the revolving armature, and by means of a pulley placed at the end of the armature shaft its power can be applied to any piece of apparatus or machinery known to the arts. But up to 1886 nearly all the electric motors had been badly designed and poorly built, and the current that should have been diverted into power was simply wasted in developing heat, so that the machines rapidly burnt out and otherwise became useless, and were altogether too expensive to run. At the present time, however, there are several electric motors in the market of excellent design and workmanship, for which as high an efficiency as over 90 per cent is claimed, and there can be no doubt that the rate of efficiency in the smaller sizes as well as in the larger is the highest that has yet been attained by any piece of power transmission machinery.

THE MOTOR READY FOR INSTANT WORK.

Thus an electric motor, or one-half of one-quarter horse power will easily show as high an efficiency as that of another sort of motor of ten or fifteen horse power, yet nobody dreams of expecting a gas engine or a steam engine of one-quarter or one-half horse power to give anything but a small return upon the fuel applied to it. Moreover, with the electric motor an enormous advantage has been the fact that when it has been installed and connections have been made with the circuits connecting it with the central station it is practically ready that minute for work. All that is necessary is the turning of a switch, and the current is instantaneously there. With the steam engine, even when the steam is taken from the steam mains in the street, considerable attention is necessary, and in the vast majority of instances the steam has to be manufactured on the spot, so that boilers are necessary, involving the attendance of an expert engineer, the supply of water and coal and the removal of ashes. Such steam plants also occupy considerable space and throw off no small amount of

heat. The idea, however, with the electric motor, is to concentrate in a central station all the inconvenience connected with the generation of steam and to transmit the energy in the form of current, so that all the user has to do is to draw off the supply as he wants it, just as he would do in turning a tap to procure a supply of water.

ALL SORTS OF WORK DONE.

Today electric motors in different parts of the country are running feed cutters in stables, and are also used to brush the horses down. Others are used to run butter churns. Not far off in the same street they are busy chopping up meat in sausage factories or making whips, or picking hair, or sawing stone, or making pens, or driving jewelers' lathes. Some are busy making watch-case machinery, and others in making shoes. Not a few of them are in use by opticians for grinding glasses, while others have their merits sung in shrill Italian as good peanut roasters. In the liquor business they have been found running bottling machines, while in the tobacco business they are not less convenient for driving the cigarette machines or making cigar boxes. They are very often used for grinding colors, and in one city of this state they have been put to the extraordinary use of squirting paint on photographs. Some of the nearest pieces of ivory turning are now done by electric motor, and if some people only knew that the pills they are so fond of were made by the same agency they would be inclined to believe that the nostrum had acquired an additional recommendation. In some cities so far has the use of electric motors gone that it is possible for a man today to drink at breakfast coffee ground and eat fruit evaporated by electric power.

A HANDY AGENT IN ALL OF LIFE.

During the morning he will conduct his business with electrically-made pens, and paper ruled by electricity, and make his records in electrically-bound books, his seven-story office being in all probability reached by electric motor elevator. At luncheon he will be able to discuss sausages, butter and bread, and at night eat ice cream and drink iced-water due to the same electrical energy. He will ride all about the place in electric cars, wear shirts and collars mangled and dried by electric motor, sport a suit of clothes and a hat blocked by the same means; on holidays ride a merry-go-round propelled by electric motor, or have his toboggan hauled up the slide with equal facility, beca led to church by an electrically-tapped bell, sing hymns to the accompaniment of an electrically-blown organ, be buried in a coffin of electric make, and last of all, have his name carved on his tombstone by the same subtle, mysterious, all-pervasive and indefatigable agency. This may sound like a wild and exuberant flight of fancy, but it is simply a faithful statement of the manner in which electricity is being applied to every one of the necessities and luxuries of life in America.

UNIVERSAL USE ONLY A MATTER OF TIME.

Outside of towns and cities the use of the electric motor still remains to be developed beyond the merest beginning, but the compact, cleanly and economical little jack-of-all trades has already made its influence felt in a large number of miscellaneous industries, and particularly in that of mining. The electric motor is already being employed in a large number of American coal mines, running pumps and elevators and ventilators and more particularly in drilling in coal and mineral-bearing rock. Out West some of the uses it has been put to in mining are especially notable. Providence, in its inscrutable dispensation of things, has generally arranged that the best mines shall be the farthest removed from the water power best adapted for working them, and hence it often happens that valuable veins have been worked at a loss or else only after mountains have been circumvented or bored through for expensive canals. With electric motors, however, water power in the shape of electric current can be carried up hill and down dale, and though it has been said that we can never grind with the water that has passed, the old adage is now strictly untrue, several instances being on record in which this has been done with the most brilliant success.

THE MINING MAN'S LIETENANT.

In not a few Western mines the energy thus reclaimed from water power several miles below is being carried back up into the hills, and there employed to run hoists and vanners, quartz mills, stamps, pumps, amalgamators and other appliances for which power is necessary. In one striking instance the electric motor has been employed to recover gold that seemed to be utterly beyond reach. In other words, it had been attached to pumps for laying bare the bed of a river in which auriferous sand had been deposited for countless ages. The river course lay at the bottom of a deep gorge, where the use of any other machinery would have been quite out of the question; but a portable little electric motor, mounted on light platforms, easily removable in case of sudden flood or other emergency, the whole problem was easily solved, and for the first time since the run rose over California the bed of that river was exposed and made to yield up its secrets and its wealth.

THE CURRENT DOING DOUBLE DUTY.

In another extraordinary instance electric motors are employed in mining purposes in the Chollar mine, in the great Comstock lode. There water, which has already done a large amount of work at the surface, is conducted under a 1600-foot head to water wheels at the bottom of the mine, which there drive an electrical generating plant. The current from the plant is conveyed by wires back to the surface and there operates six electric motors, each of 75-horse power, which help in driving the big main shaft of the mill, thus supplementing the work which is done on the same shaft by the water wheels at the surface of the ground. There is no other way conceivable in which the energy developed by the water falling under this tremendous head could be utilized and it remained for the genius of American mechanical and electrical engineers to carry out such a stupendous enterprise.

CHURCH SERVICES.

FIRST BAPTIST CHURCH—Mojave and Jefferson streets. P. D. Rickerson, pastor. Sunday school, 9:45 a. m. C. S. Scott, superintendent. Preaching at 11 a. m. Topic, "Liberty under Law. Who shall be King?" All are welcome. No evening service.

METHODIST EPISCOPAL CHURCH—Mojave and Washington streets. Preaching at 11 a. m. by Rev. M. F. Norton of Globe. Subject, "The new Dispensation compared with the old." Sunday school at 9:30 a. m. All are invited to attend.

METHODIST EPISCOPAL CHURCH, South—Corner of Monroe and Center streets. Rev. F. D. Fuller pastor. Preaching at 11 a. m. and 8 p. m. Sunday school at 9:30 a. m.

ADVENTIST TABERNACLE—Centre street. No morning service. Subject the evening, "The Covenants." All are invited.

CHRISTIAN CHURCH—Corner Jefferson and Maricopa streets. No services. Sunday school at 9:30.

LOCAL BREVITIES.

The Board of Equalization has been hard at work during the week.

The Pioneer Band took in the town last evening in the interest of the Fiesta. Phoenix Typographical Union, No. 237, meets this afternoon in THE REPUBLICAN composing rooms.

Mesa City held quite a celebration on the Fourth. The Declaration was read by Prof. Banta and B. F. Johnson delivered the oration. A dance at the hall wound up the festivities.

Early yesterday morning a Mexican woman named Aros started in to beat a boy with her fists. She was gathered in, and was fined by Judge Richards in the sum of \$8.

The Odd Fellows installed their new officers last evening. The following were among those seated: C. S. Scott, Noble Grand; D. L. Murray, Vice Grand; John Grey, Secretary; Ed. Gil-mour, Treasurer.

The Recorder took pity on a half dozen offenders brought before him yesterday and dismissed the batch. Recorder Schwartz is so patriotic that he can forgive almost any infraction of the peace when it is perpetrated in the display of national pride.

PERSONALS.

Fred Brown has returned from his Eastern trip.

H. H. Smith, of Kellogg Wells, is at the Gregory House.

Messrs. Williams and Samuels of Maricopa are in the city.

Mrs. B. F. Porter has returned from a visit to Southern California.

Frank Fuqua left yesterday on a trip to his old home in Missouri.

C. T. Hayden was in the city yesterday looking after his water suit.

Mrs. C. L. Mosher leaves on this morning's train for San Francisco.

A. J. Halbert is around keeping his fences in good order for County Treasurer.

P. C. Bicknell, census enumerator for the western district of this county, has finished his labors and is now in the city making up his report.

B. Heyman and family leave this morning for San Francisco. They expect to extend their summer trip to the beautiful waters of Puget Sound.

The Normal School case brought to the city yesterday from Tempe, Dr. F. J. Hart, A. J. Peters, Prof. H. B. Farmer, Attorney Hawkins and Prof. R. L. Long.

Mrs. Jesus Otero, whose ankle was sprained by the breaking of a bench at the evening exercises of the Fourth, is progressing well. The hurt was not a serious one.

Sergeant Ambler, who was injured Friday evening, is reported by Dr. MacEntire as resting easily and in no danger. He will probably be confined to the house for six weeks or more.

Rev. F. M. Norton is in Phoenix on a visit of a few days, and will tomorrow fill the pulpit of the Washington Street Methodist Church. The reverend gentleman is now the pastor of the Methodist church at Globe.

THE HOTELS.

LEMON HOTEL. Mrs. Carterson, city. L. V. Guthrie, Maricopa. Lee Dunn, Tempe. Charles Gethis, Socorro.

COMMERCIAL HOTEL. W. C. Deputy, Phoenix. J. E. Lacons, Dekala. J. O'Brien, Portland. W. F. Williams, Los Ang. Wm Maxwell, Neb. W. J. Homer & wife, city.

MILLS HOUSE. P. M. Williams, Maricopa. Geo. M. Sutherland, Tuc. A. Redwell, Phoenix.

County Recorder's Office.

Reported daily by Greene & Wood, Abstractors. The following instruments were yesterday filed for record in the office of the County Recorder:

Tempe Land and Improvement Company to E. A. Murphy—Lot 17, block 4, Tempe; consideration, \$500.
Benjamin J. Johnson and wife to Charles C. Brown—S. W. 1/4, sec 9, tp 1 N, R 5 E, except that portion deeded to Boone Lewis on June 17, 1890; consideration, \$177.75.
Fielding D. Ambrose and wife to Byron Jackson—S. E. 1/4 of N. E. 1/4, sec 31, tp 1 N, R 1 E; consideration, \$477.75.
Chas. R. Drake, Receiver—Receiver's receipt to F. S. Avise—S. W. 1/4, sec 5, tp 2 N, R 2 E.

No Cure No Pay.

Dr. Hyde, oculist, office and residence east of Gregory house, Phoenix, Ariz. jne 23-tf

PREFERRED LOCALS.

Girl to wait on table at restaurant wanted at once. Apply at REPUBLICAN business office.

Parties wanting seedless Sultana and Muscat grapes for canning, etc., leave orders at Phoenix Bakery. 39-1m

For a first-class breakfast go to the Maricopa House, at Maricopa.

If you want A 1 nobby fit call on Nicholson the Tailor.

Cheap rooms, free bath, at the Vendome.

Call on Jim Bradbury for the coolest glass of beer in the city.

A choice line of imported cigars at Bradbury's, on Washington street.

Bradbury's, on Washington street, is the place to drop in for an ice cold glass of beer, or for a drink of the choicest old Bourbon whisky sold in the city of Phoenix.

Nicholson the Tailor has received an elegant line of trouserings and suitings—light goods to suit the season.

What the Mexican War Cost.

(Biography of Matthew Galbraith Perry.)

The United States employed in the invasion of a sister Republic about one hundred thousand armed men. Of these 26,690 were regular troops, 56,926 volunteers, while over 15,000 were in the navy or in the department of commissariat and transportation. Probably as many as 80,000 soldiers were actually in Mexico. Of this host 120 officers and 1,400 men fell in battle or died of wounds, and 100 officers and 18,000 men perished by disease. These figures, by the way, are from the army rolls. Another writer gives the total in round numbers of American war employees lost in battle at 5000, and by sickness 15,000. About 1000 men of the army of occupation died each month of Garrison fever in the City of Mexico, and many were ruined in health and character.

In all the loss of manhood by glory and malaria, was fully 25,000 men. The war cost the United States directly a sum estimated between \$120,000,000 and \$165,500,000. Including the pensions recently voted, this amount will be greatly increased.

FOR SALE OR TRADE.

Two stallions, Norm and Burdo, can be bought so cheap as to frighten you. Easy payments with good security, or will trade for hay, grain or best cattle. Address Port Collins, O. box 394, Phenix. 45fwad

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BARGAINS

BARGAINS

COMMENCING SATURDAY,

JULY 5, 1890.

Our Summer Stock of Clothing
Hats, Shoes and Dry Goods
Must Be Closed Out Before
SEPTEMBER 15, 1890,
SO AS TO BE PREPARED FOR OUR

FALL GOODS

DILLON & KENEALY
LEADERS IN LOW PRICES.

OPERA HOUSE
DRUG STORE

E. E. PROWELL,
PROPRIETOR.

NEWLY OPENED

FRESH STOCK OF THE

Best and Purest Drugs
EVER BROUGHT TO PHOENIX.

Elegant Toilet Articles,
Fancy Goods, Perfumes, Soaps,
Flavoring Extracts,
And All Articles Usually Found
in First-Class Drug Stores.

The Prescription Department is under the charge of a Graduate of one of the best Colleges of Pharmacy in the country, and especial attention is given to Compiling Prescriptions, both Day and Night.

Call and See Us, Whether You Wish to
Purchase Anything or Not.

The Opera House Drug Store Never Closes.

A. GOLDSCHMIDT & CO.

WHOLESALE GROCERS,

TUCSON, ARIZONA.

ORDERS BY MAIL PROMPTLY AND CAREFULLY ATTENDED TO—
Sole Agents for the Victoria Mineral Water, the only Genuine Mineral Water in this Territory.

CLOSING OUT!

SALE!

We Have Concluded to Close Out Our Phoenix House.

WE WILL OFFER OUR ENTIRE STOCK
—CONSISTING OF—

FURNITURE,
BEDDING,
CARPETS,

Crockery,
Glassware,
Wallpaper,

Cutlery and Platedware—

AT REDUCED PRICES.

UNTIL THE STOCK IS ENTIRELY DISPOSED OF.

We Have Closed Our Books and Will
SELL FOR CASH ONLY.

Parties Indebted to Us Will Please Call and Settle.

A Rare Opportunity

IS NOW OFFERED TO ANYONE WISHING TO ENGAGE IN
A First-Class Business.

—AS WE ARE KNOWN TO BE—

THE LEADING HOUSE

—In Our Line In the Territory—

SCHOENFELD & HEYMAN,

Seattle, Wash.

Phoenix, Ariz.